EXHIBIT C

UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF NEW JERSEY
CAMDEN VICINAGE
MDL NO. 2875

IN RE: VALSARTAN, LOSARTAN, AND IRBESARTAN PRODUCTS LIABILITY LITIGATION :

THIS DOCUMENT RELATES TO Gaston Roberts et al. v. Zhejiang Huahai Pharmaceutical Co., et al., :

Case No. 1:20-cv-00946-RMB-SAK:

Videotaped remote deposition of NADIM MAHMUD, M.D., taken in the above-entitled matter before Suzanne J. Stotz, a Certified Court Reporter (License No. 30XI00184500) and Notary Public of the State of New Jersey, taken on Friday, May 2, 2025, commencing at 9:03 a.m. EDT.

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something is oftentimes based, first, on animal studies. Is there anything potentially relevant to humans to justify doing a study.

You know, my recollection is that there are studies for -- for each of the things I mentioned, but I -- you know, I can't -- I can't speak to the strength of them off the top of my head. I'd have to review them again.

BY MR. VAUGHN:

Q. Do you have an opinion if there's more literature or less literature on benzene causing liver cancer in humans than NDMA?

MS. ROSE: Object to the form.

THE WITNESS: No, I don't have an opinion on that. I -- I haven't reviewed the literature with respect to benzene inasmuch depth as I have with NDMA as pertain- -- pertaining to this case.

But I do recall that there are some studies. I can't speak to the volume or depth of them.

BY MR. VAUGHN:

Q. Okay. And then on this web page we

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were on, it has common liver diseases; and it has cirrhosis as a link.

MR. VAUGHN: If you'd go ahead and drop the cirrhosis one, Kathryn, that will be Exhibit 5.

(Whereupon, Exhibit 5, Penn Medicine Cirrhosis - Symptoms and Causes, was marked for identification.)

MS. AVILA: Okay. It should be in there.

MR. VAUGHN: Okay.

BY MR. VAUGHN:

Q. And for -- the definition of cirrhosis is scarring of the liver and poor liver function.

Do you agree with that definition of cirrhosis?

A. I -- I think it's a very, probably, oversimplified definition of cirrhosis for the purpose of the lay public.

I think I've already given you my definition of cirrhosis, but, you know, I think for -- for simplicity and communicating it to a patient who might be visiting this website, I think it's a -- it's a rudimentary layperson

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summary.

Q. And for -- for the layperson, it would be two things, the scarring of the liver plus the poor liver function to have cirrhosis, correct?

MS. ROSE: Object to the form.

THE WITNESS: Yes. So I mean, I -- I disagree a little bit with the characterization there because, as I've stated before, you can have cirrhosis without having clear evidence of derangement of liver synthetic function. Oftentimes, that is seen later in the progression of cirrhosis.

You know, perhaps -- again, I don't know who makes this website or who's responsible for the content, but, you know, I'm not responsible. I -- I don't -- I don't write this myself. You know, Penn Medicine -- I have no idea who actually writes this.

But I -- I assume it's filtered through a lens to make this very simplistic for patients to just broadly understand what cirrhosis often means.

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And so yes, it means scarring of the liver, and it can mean poor liver function; but as I've stated previously, you can have cirrhosis and actually have relatively reserved liver synthetic markers on your blood work.

BY MR. VAUGHN:

Q. And so do you disagree with the information that Penn Medical is putting out to the public?

MS. ROSE: Object to the form.

THE WITNESS: Like I said, I think that my -- my understanding and nuanced understanding of cirrhosis as a clinician goes much more beyond what, you know, this website is communicating to patients.

I think that, likely, they're trying to keep things very simple to provide at a high level, you know, some understanding of what these medical terms may generally mean.

I don't think their intention is likely to be extremely detailed about the technical definitions of cirrhosis.

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Historically, we do -- we -- we don't -- usually once we make a diagnosis of cirrhosis, we regard the patient to have cirrhosis moving forward, and we manage them with the assumption that there is cirrhosis.

There are some scenarios like very specific scenarios, where patients may have some improvement in their -- their estimated fibrosis, very, very specific scenarios. And one scenario is Hepatitis C virus. That's probably the best studied one where a patient has chronic Hepatitis C. They develop cirrhosis, and then they're treated with a medication that can cure the Hepatitis C entirely.

Those medications were, you know, developed in, like 2015, 2016. And so now we're able to cure Hepatitis C, and we've observed over the past decade or so in following these patients, that some of those patients might go from F4, which is cirrhosis, to F3.

The reason why I say it's a pretty exceptional circumstance is a lot of those patients the only reason -- the only cause of

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their liver disease was Hepatitis C, and there's a very abrupt -- abrupt and complete removal of that underlying cause of liver disease. So that doesn't really translate to -- to MASLD and MASH for the vast majority of patients where, you know, to achieve that abrupt transition, you need to have substantial and sustained weight loss, which unfortunately, is very tough for patients to the achieve.

MR. VAUGHN: Nina, I'm at a great spot for a break if you want to do lunch now.

MS. ROSE: Yeah.

Does that work for you, Doctor?

THE WITNESS: Yeah.

THE VIDEOGRAPHER: Off the record, 12:45.

(Whereupon, a lunch was taken.)

THE VIDEOGRAPHER: We are back on the record at 1:25 p.m.

BY MR. VAUGHN:

Q. Welcome back, Doctor.

A. How are you doing?

Q. Good. Earlier we were talking about how platelet counts are part of the CBC,

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correct?

A. Yes.

Q. And would thrombocytopenia be an abnormal CBC result?

A. Yes, generally. Yeah. If the platelet count's less than 150, that would be regarded to be an abnormal CBC.

Q. I want to go back to your expert report, which was Exhibit 1. I'll go ahead and screenshare it, but feel free to look at it yourself as well.

A. Okay.

Q. I want to go to page 18 right now. I, first, want to direct you to this part of your opinion, which is, "Cirrhosis refers to significant scar tissue that impairs liver function."

You agree with that, correct?

A. Yes.

Q. Okay. And that -- and that is what Penn Medical is saying as well, correct, that it's both the scar tissue plus the impaired liver function?

A. Yes.

Q. Okay. And then you start talking

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about FIB-4.

Is that what you were discussing earlier as far as being able to diagnose cirrhosis with?

MS. ROSE: Objection to the form.

THE WITNESS: Yeah. Not -- not -- not in and of itself to diagnose the cirrhosis, but as a tool to risk stratify -- risk stratify patients with chronic liver disease who may require further testing to -- to rule in or rule out cirrhosis.

BY MR. VAUGHN:

Q. And within Mr. Roberts' medical records, does it ever mention FIB-4?

A. I did not see any mentions of FIB-4.

Q. And you note that a FIB-4 of less than 1.3 effectively rules out advanced fibrosis.

Can you explain that?

A. Sure. So if you calculate the FIB-4 for a patient, again, based on the age, AST, ALT, and platelet count, if you get a very low number, less than 1.3, that -- that patient

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You know, we talked about the stage of cancer that he was diagnosed with. It's really important to highlight that when he was diagnosed in, you know, April -- you know, July/April of 2018, he did not have early stage hepatocellular carcinoma. He had multiple lesions. There were two lesions that were clear -- clearly LI-RADS 5 lesions that were, you know, HCC, the largest of which, from my recollection, was 5.8 centimeters in diameter.

You don't get a 5.8-centimeter diameter HCC overnight. That does not occur quickly. That takes a long time to get there, to that size. And fortunately, this is something that's been studied in great detail across many studies. There's a lot of interest in understanding growth rates of HCC so we can understand what to expect in patients and how to prognosticate.

And in my expert report, you know, I cite the literature, and I give the different ranges, the average tumor volume

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doubling time, the extreme cases of very aggressive growth and -- and very slow growth. And I ran simulations for all of those.

And no matter what assumption you take, even if I assumed the most aggressive form of hepatocellular carcinoma with the fastest growth rates that are observed in -- in -- you know, in multiple observational studies, Mr. Roberts would have already had HCC in his liver prior to the time he was first exposed to NDMA-contaminated Valsartan.

So there's no plausible way you can say that NDMA, regardless of the dose, could have caused it if it's already there. So the temporality is -- is a really key point in this case and one that we didn't really talk about explicitly.

But I have to highlight it in the context of this to explain why my opinion doesn't change. Even if he had, hypothetically, had a higher dose exposure to NDMA, my view is that his cancer was already there.

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BY MR. VAUGHN:

Q. Understood. And I was planning to get to it if we had time in the deposition.

What's the fastest growth rate for HCC?

A. Yeah. So, you know, we look at this mostly in terms of tumor volume doubling time. I'm pulling up my report to give you very precise numbers.

Okay. So tumor volume doubling time, again, these are -- these estimates are aggregated. It's actually coming from a meta-analysis of many different studies to get as accurate of representation of the range of growth rates as possible.

The most -- so if you take the 95-percent kind of confidence interval in terms of one extreme to the other, the most sort of aggressive growth rates are on the scale of 3.9 months for tumor volume doubling time.

And so I have table where I kind of go through these calculations. The average is about 4.6 months for tumor volume doubling times, and the slower one are 5.3 months of tumor volume doubling time.

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Q. So 3.9 months is the quickest doubling time of HCC?

A. Tumor volume doubling time, yes.

Q. Is it your opinion that NDMA cannot cause cirrhosis?

A. So I think, you know, in -- in animal literature, you know, at a sufficiently high dose, you know, I do think that NDMA can likely cause hepatic fibrosis and likely cirrhosis, you know, in, you know, rodent studies, for instance. But I don't think that's been demonstrated to any sufficient degree in humans.

Q. Did you search for that?

A. Yes.

Q. What -- where -- what did you search?

A. Yeah. So I had a range of different searches. You know, I looked for, you know, NDMA, you know, liver fibrosis, liver, obviously hepatocellular carcinoma. I looked, you know, nitrosamine, you know, liver cirrhosis, hepatocellular carcinoma.

I did this specifically because in the -- the plaintiff expert witness report, she

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A. That's okay. Go ahead.
Q. What does the word "indolent" mean?
A. Sorry. Where are you looking?
Q. I'm not looking at the study.
Are you familiar with the word "indolent"?
A. Indolent. Yes.
Q. Indolent. Sorry.
What does that mean?
A. Yeah. Indolent generally means, you know, very slow growing or not -- you know, it's something on that spectrum. Not really -- not actively showing significant growth or very slow growing. That's usually how indolent is used.
Q. Can you see here in the study side where they talk about rapidly growing tumors among studies conducted in Asia -- sorry, in recent studies with diverse liver disease etiologies reported more indolent growth among patients with nonviral liver disease.
What is "nonviral liver disease"?
A. Nonviral means not related to Hepatitis B or Hepatitis C.
Q. And so HCCs that are not related to

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Hep A or -- sorry. Scratch that.
HCCs that are not related to Hep B or Hep C typically grow slower, correct?
A. Yes. I'd say so.
Q. And the study authors say that's particularly important in the western world.
That's here in the United States right, the "western world"?
A. Yes.
Q. Where -- where HCC is increasingly related to nonviral etiologies such as NASH and alcohol-related cirrhosis.
And so is this saying that HCC that is related to NASH is typically slow-growing?
A. Yes. That's --
MS. ROSE: Object to the form.
THE WITNESS: It's fair to say that HCC in NASH is typically more slow-growing than what you would observe in viral hepatitis-related HCC.
BY MR. VAUGHN:
Q. And it's your opinion that Mr. Roberts' HCC is related to NASH, correct?
A. Yes. My opinion is that HCC in Mr. Roberts' case -- well, it's -- it's related

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to -- again, there's multiple risk factors, but I think the primary one is his MASH-related cirrhosis. Yeah.
So I mean, but -- but I think we were highlighting his -- he's more likely to have a slow-growing tumor. So -- so there's less reason to assume that he would have extremely rapid growth.
He's more likely to be on the side of the distribution of a slow-growing tumor, which, again, is modeled in that table I showed you. So if we took, you know, the assumption of slow growth, which is 5.3 months, then we absolutely would have expected that he -- you know, he would have had, you know, lesions in the liver at that time.
So I think that's, once again, consistent with what I'm -- what I'm modeling here.
Q. And so if we go with the slow growth, which would be what you would expect with HCC from someone with NASH, when the radiology report from 4/18/16 was done, he should have nearly a 2-centimeter tumor at that time, right?

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MS. ROSE: Object to the form.
THE WITNESS: So look, these are not guaranteed -- guarantees. There's variation within every etiology of liver disease. It's not like every single patient with NASH-related cirrhosis will have a growth rate of 5.3 centimeters. There's inherent variability based on myriad factors.
So, you know, all this is communicating is that it's more likely than not that he already had hepatocellular carcinoma present in the liver when he was first exposed to NDMA.
There's going to be variation in what the actual size of the lesions might have been. There's -- and, of course, there's error introduced by the assumption of a sphere.
So this is not a perfect prediction. But in the plausible ranges of where most patients fit -- and in particular patients with NASH or MASH-related cirrhosis, as you've highlighted, where the tumors grow more